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(54) Title: CLEANING COMPOSITIONS (57) Abstract <p>The present invention relates to a cleaning composition containing at least one first surfactant selected from the group consisting of nonionic surfactants, anionic surfactants, partially esterified ethoxylated glycerol surfactants, and alkyl polyglucoside surfactants and mixtures thereof and a second surfactant selected from the group consisting of sulfonamide, hydroxy sulfobetaine, betaines, amine oxides, glucoamides, N-C₁₋₃ alkyl C₈-C₁₆ alkyl glucoamide, and C₅-C₁₂ N-alkyl aldoamide and mixtures thereof and water.</p>			

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CLEANING COMPOSITIONS

Background of the Invention

In recent years all-purpose liquid detergents have become widely accepted for

5 cleaning hard surfaces, e.g., painted woodwork and panels, tiled walls, wash bowls, bathtubs, linoleum or tile floors, washable wall paper, etc. Such all-purpose liquids comprise clear and opaque aqueous mixtures of water-soluble synthetic organic detergents and water-soluble detergent builder salts. In order to achieve comparable cleaning efficiency with granular or powdered all-purpose cleaning compositions, use of
10 water-soluble inorganic phosphate builder salts was favored in the prior art all-purpose liquids. For example, such early phosphate-containing compositions are described in U.S. Patent Nos. 2,560,839; 3,234,138; 3,350,319; and British Patent No. 1,223,739.

In view of the environmentalist's efforts to reduce phosphate levels in ground water, improved all-purpose liquids containing reduced concentrations of inorganic phosphate
15 builder salts or non-phosphate builder salts have appeared. A particularly useful self-opacified liquid of the latter type is described in U.S. Patent No. 4,244,840.

However, these prior art all-purpose liquid detergents containing detergent builder salts or other equivalent tend to leave films, spots or streaks on cleaned unrinsed surfaces, particularly shiny surfaces. Thus, such liquids require thorough rinsing of the cleaned
20 surfaces which is a time-consuming chore for the user.

In order to overcome the foregoing disadvantage of the prior art all-purpose liquid, U.S. Patent No. 4,017,409 teaches that a mixture of paraffin sulfonate and a reduced concentration of inorganic phosphate builder salt should be employed. However, such compositions are not completely acceptable from an environmental point of view based
25 upon the phosphate content. On the other hand, another alternative to achieving phosphate-free all-purpose liquids has been to use a major proportion of a mixture of anionic and nonionic detergents with minor amounts of glycol ether solvent and organic amine as shown in U.S. Patent NO. 3,935,130. Again, this approach has not been completely satisfactory and the high levels of organic detergents necessary to achieve

cleaning cause foaming which, in turn, leads to the need for thorough rinsing which has been found to be undesirable to today's consumers.

Another approach to formulating hard surfaced or all-purpose liquid detergent composition where product homogeneity and clarity are important considerations involves

5 the formation of oil-in-water (o/w) microemulsions which contain one or more surface-active detergent compounds, a water-immiscible solvent (typically a hydrocarbon solvent), water and a "cosurfactant" compound which provides product stability. By definition, an o/w microemulsion is a spontaneously forming colloidal dispersion of "oil" phase particles having a particle size in the range of 25 Å to 800 Å in a continuous aqueous phase..

10 In view of the extremely fine particle size of the dispersed oil phase particles, microemulsions are transparent to light and are clear and usually highly stable against phase separation.

Patent disclosures relating to use of grease-removal solvents in o/w microemulsions include, for example, European Patent Applications EP 0137615 and EP 0137616 -
15 Herbots et al; European Patent Application EP 0160762 - Johnston et al; and U.S. Patent No. 4,561,991 - Herbots et al. Each of these patent disclosures also teaches using at least 5% by weight of grease-removal solvent.

It also is known from British Patent Application GB 2144763A to Herbots et al, published March 13, 1985, that magnesium salts enhance grease-removal performance of
20 organic grease-removal solvents, such as the terpenes, in o/w microemulsion liquid detergent compositions. The compositions of this invention described by Herbots et al. require at least 5% of the mixture of grease-removal solvent and magnesium salt and preferably at least 5% of solvent (which may be a mixture of water-immiscible non-polar solvent with a sparingly soluble slightly polar solvent) and at least 0.1% magnesium salt.

25 However, since the amount of water immiscible and sparingly soluble components which can be present in an o/w microemulsion, with low total active ingredients without impairing the stability of the microemulsion is rather limited (for example, up to 18% by weight of the aqueous phase), the presence of such high quantities of grease-removal

solvent tend to reduce the total amount of greasy or oily soils which can be taken up by and into the microemulsion without causing phase separation.

The following representative prior art patents also relate to liquid detergent cleaning compositions in the form of o/w microemulsions: U.S. Patents Nos. 4,472,291 - Rosario;

5 4,540,448 - Gauteer et al; 3,723,330 - Sheflin; etc.

Liquid detergent compositions which include terpenes, such as d-limonene, or other grease-removal solvent, although not disclosed to be in the form of o/w microemulsions, are the subject matter of the following representative patent documents: European Patent Application 0080749; British Patent Specification 1,603,047; 4,414,128; and 4,540,505.

10 For example, U.S. Patent No. 4,414,128 broadly discloses an aqueous liquid detergent composition characterized by, by weight:

(a) from 1% to 20% of a synthetic anionic, nonionic, amphoteric or zwitterionic surfactant or mixture thereof;

15 (b) from 0.5% to 10% of a mono- or sesquiterpene or mixture thereof, at a weight ratio of (a):(b) lying in the range of 5:1 to 1:3; and

(c) from 0.5% to 10% of a polar solvent having a solubility in water at 15°C in the range of from 0.2% to 10%. Other ingredients present in the formulations disclosed in this patent include from 0.05% to 2% by weight of an alkali metal, ammonium or alkanolammonium soap of a C₁₃-C₂₄ fatty acid; a calcium sequestrant from 0.5% to 13%
20 by weight; non-aqueous solvent, e.g., alcohols and glycol ethers, up to 10% by weight; and hydrotropes, e.g., urea, ethanolamines, salts of lower alkylaryl sulfonates, up to 10% by weight. All of the formulations shown in the Examples of this patent include relatively large amounts of detergent builder salts which are detrimental to surface shine.

U.S. Patent 5,082,584 discloses a microemulsion composition having an anionic
25 surfactant, a cosurfactant, nonionic surfactant, perfume and water; however, these compositions do not possess the low ecotoxicity profile and the improved interfacial tension properties as exhibited by the compositions of the instant invention.

British Patent No 1,453,385 discloses polyesterified nonionic surfactants similar to the polyesterified nonionic surfactants of the instant invention. However, these nonionic

surfactants of British Patent 1,453,385 do not disclose the formula (II) portion of the instant composition. Additionally, the formulated compositions of British Patent 1,453,385 fail to disclose the critical limitations of the instant invention.

A number of patents teach esterified ethoxylated glycerol compounds for various

5 applications. These patents are Great Britain 1,453,385; Japan 59-1600 and Japan 58-206693 and European Patent Application 0586,323A1. These publications fail to appreciate that a mixture of esterified ethoxylated glycerol and nonesterified ethoxylated glycerol, when used in a hard surface cleaning composition, functions as a grease release agent.

10 Nonionic surfactants are in general chemically inert and stable toward pH change and are therefore well suited for mixing and formulation with other materials. The superior performance of nonionic surfactants on the removal of oily soil is well recognized.

Nonionic surfactants are also known to be mild to human skin. However, as a class, nonionic surfactants are known to be low or moderate foamers. Consequently, for
15 detergents which require copious and stable foam, the application of nonionic surfactants is limited. There have been substantial interest and efforts to develop a high foaming detergent with nonionic surfactants as the major ingredient. Yet, little has been achieved.

The prior art is replete with light duty liquid detergent compositions containing nonionic surfactants in combination with anionic and/or betaine surfactants wherein the
20 nonionic detergent is not the major active surfactant, as shown in U.S. Patent No. 3,658,985 wherein an anionic based shampoo contains a minor amount of a fatty acid alkanolamide. U.S. Patent No. 3,769,398 discloses a betaine-based shampoo containing minor amounts of nonionic surfactants. This patent states that the low foaming properties of nonionic detergents renders its use in shampoo compositions non-preferred. U.S.
25 Patent No. 4,329,335 also discloses a shampoo containing a betaine surfactant as the major ingredient and minor amounts of a nonionic surfactant and of a fatty acid mono- or di-ethanolamide. U.S. Patent No. 4,259,204 discloses a shampoo comprising 0.8-20% by weight of an anionic phosphoric acid ester and one additional surfactant which may be either anionic, amphoteric, or nonionic. U.S. Patent No. 4,329,334 discloses an anionic-

amphoteric based shampoo containing a major amount of anionic surfactant and lesser amounts of a betaine and nonionic surfactants.

U.S. Patent No. 3,935,129 discloses a liquid cleaning composition based on the alkali metal silicate content and containing five basic ingredients, namely, urea, glycerin,

5 triethanolamine, an anionic detergent and a nonionic detergent. The silicate content determines the amount of anionic and/or nonionic detergent in the liquid cleaning composition. However, the foaming property of these detergent compositions is not discussed therein.

U.S. Patent No. 4,129,515 discloses a heavy duty liquid detergent for laundering
10 fabrics comprising a mixture of substantially equal amounts of anionic and nonionic surfactants alkanolamines and magnesium salts, and, optionally, zwitterionic surfactants as suds modifiers.

U.S. Patent No. 4,224,195 discloses an aqueous detergent composition for
laundrying socks or stockings comprising a specific group of nonionic detergents, namely,
15 an ethylene oxide of a secondary alcohol, a specific group of anionic detergents, namely, a sulfuric ester salt of an ethylene oxide adduct of a secondary alcohol, and an amphoteric surfactant which may be a betaine, wherein either the anionic or nonionic surfactant may be the major ingredient. The specific class of anionics utilized in this patent is the very same group of anionic detergents expressly excluded in present invention in order to
20 eliminate the alkanol ethoxylate sulfation process and the potential dioxane toxicity problem. Furthermore, this patent finds heavily foaming detergents undesirable for the purpose of washing socks.

The prior art also discloses detergent compositions containing all nonionic surfactants as shown in U.S. Patent Nos. 4,154,706 and 4,329,336 wherein the shampoo
25 compositions contain a plurality of particular nonionic surfactants in order to effect desirable foaming and deterative properties despite the fact that nonionic surfactants are usually deficient in such properties.

U.S. Patent No. 4,013,787 discloses a piperazine based polymer in conditioning and shampoo compositions which may contain all nonionic surfactant or all anionic surfactant.

U.S. Patent No. 4,450,091 discloses high viscosity shampoo compositions

5 containing a blend of an amphoteric betaine surfactant, a polyoxybutylene polyoxyethylene nonionic detergent, an anionic surfactant, a fatty acid alkanolamide and a polyoxyalkylene glycol fatty ester. But, none of the exemplified compositions contains an active ingredient mixture wherein the nonionic detergent is present in major proportion, probably due to the low foaming properties of the polyoxybutylene polyoxyethylene nonionic detergent.

10 U.S. Patent No. 4,595,526 describes a composition comprising a nonionic surfactant, a betaine surfactant, an anionic surfactant and a C₁₂-C₁₄ fatty acid monoethanolamide foam stabilizer.

The Journal of Colloid and Interface Science, Vol. 138, No. 1, August 1990
discloses the synthesis of N-substituted aldonamide and their use in the formation of
15 lyotropic liquid crystals.

Molecular Crystal Liquid Crystal, 1985, Vol. 128, pp. 277-286 and Molecular Crystal Liquid Crystal, 1986, Vol. 135, pp. 93-110 both disclose a new family of liquid crystals which are N-substituted aldonamides.

Belgian Patent No. BE-814,377 teaches preparation of aldonic acid amides and
20 medicaments containing them as analgesic antiinflammatory and vaso dilating agents. However their use as surfactants in a cleaning compositions is not disclosed.

Summary of the Invention

The present invention relates to a class of N-alkyl aldonamide surfactants which are used in cleaning compositions in combination with at least one other surfactant which can
25 be a nonionic surfactant, an anionic surfactant, a zwitterionic surfactant, an amine oxide surfactant and an alkyl polyglucoside and mixtures thereof. The resultant cleaning compositions exhibit improved grease and soil removal as well as exhibiting improved mildness.

Detailed Description of the Invention

The present invention relates to a light duty liquid composition comprising by weight:

- (a) 0.5 to 40 wt. %, more preferably 1 to 30 wt. % of at least one first surfactant
5 selected from the group consisting of nonionic surfactants, partially esterified ethoxylated glycerol surfactant, anionic surfactant, and alkylpolyglucoside surfactants and mixtures thereof;
- (b) 0.1 to 10 wt. %, more preferably 0.5 to 8 wt. % of a second surfactant
10 selected from the group consisting sulfonamide, hydroxy sulfobetaine, betaines, amine oxides, glucoamides, N-C₁₋₃ alkyl C₈-C₁₆ alkyl glucoamide, and C₅-C₁₂ N-alkyl aldoamide and mixtures thereof;
- (c) 0 to 12 wt. %, more preferably 0.5 to 8 wt. % of at least one solubilizer; and
(d) the balance being water.

The present invention also relates to a light duty liquid microemulsion composition
15 comprising by weight:

- (a) 0.5 to 40 wt. %, more preferably 1 to 30 wt. % of at least one first surfactant
selected from the group consisting of nonionic surfactants, partially esterified ethoxylated glycerol surfactant, anionic surfactant, and alkylpolyglucoside surfactants and mixtures thereof;
- 20 (b) 0.1 to 10 wt. %, more preferably 0.5 to 8 wt. % of a second surfactant
selected from the group consisting sulfonamide, hydroxy sulfobetaine, betaines, amine oxides, glucoamides, N-C₁₋₃ alkyl C₈-C₁₆ alkyl glucoamide, and C₅-C₁₂ N-alkyl aldoamide and mixtures thereof;
- (c) 0.5 to 50 wt. % of a cosurfactant;
- 25 (d) 0.4 to 10 wt. % of a perfume, water insoluble hydrocarbon or essential oil;
- (e) 0 to 12 wt. % of a solubilizer; and
- (f) the balance being water.

The present invention relates to an all purpose liquid composition comprising by weight:

(a) 0.5 to 30 wt. %, more preferably 1 to 25 wt. % of at least one first surfactant selected from the group consisting of nonionic surfactants, partially esterified ethoxylated glycerol surfactant, anionic surfactant, and alkylpolyglucoside surfactants and mixtures thereof;

5 (b) 0.1 to 10 wt. %, more preferably 0.5 to 8 wt. % of a second surfactant selected from the group consisting sulfonamide, hydroxy sulfobetaine, betaines, amine oxides, glucoamides, N-C₁₋₃ alkyl C₈-C₁₆ alkyl glucoamide, and C₅-C₁₂ N-alkyl aldoamide and mixtures thereof;

(c) 0 to 6 wt. % of a solubilizer; and

10 (d) the balance being water.

The present invention relates to a microemulsion hard surface cleaning composition comprising by weight:

(a) 0.5 to 30 wt. %, more preferably 1 to 25 wt. % of at least one first surfactant selected from the group consisting of nonionic surfactants, partially esterified ethoxylated glycerol surfactant, anionic surfactant, and alkylpolyglucoside surfactants and mixtures thereof;

15 (b) 0.1 to 10 wt. %, more preferably 0.5 to 8 wt. % of a second surfactant selected from the group consisting sulfonamide, hydroxy sulfobetaine, betaines, amine oxides, glucoamides, N-C₁₋₃ alkyl C₈-C₁₆ alkyl glucoamide, and C₅-C₁₂ N-alkyl aldoamide and mixtures thereof;

(c) 0.5 to 50 wt. % of a cosurfactant;

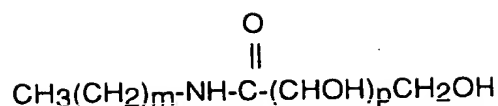
(d) 0.4 to 10 wt. % of a perfume, water insoluble hydrocarbon or essential oil;

and

(e) the balance being water.

25 The supplemental surfactant used in the instant cleaning compositions is an alkyl aldonamide which is present at a concentration of 0.1 to 10 wt. %, more preferably 0.5 to 8 wt. %.

The N-alkyl aldonamide is depicted by the formula:

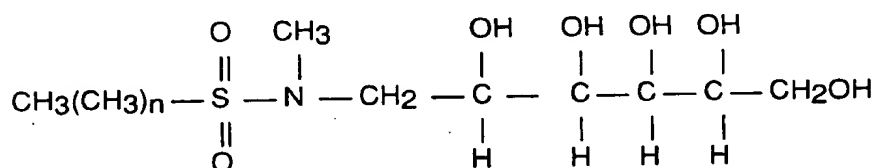


wherein m is 6 to 12, more preferably 7 to 11 and p is 3 to 7, more preferably 3 to 5. A

5 preferred N-alkyl aldoamide is N-octyl reboamide. The N-alkyl aldonamide is prepared by

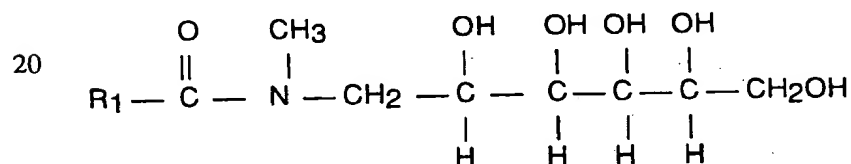
solubilizing the corresponding aldonolactone in methanol and adding to the solution of lactone an amine. The reaction between the lactone and amine is allowed to proceed for 8 hours at room temperature. The resultant N-alkyl aldonamide precipitates out of solution. The precipitate is filtered and recrystallized twice in methanol.

10 The sulfoamide is depicted by the formula:



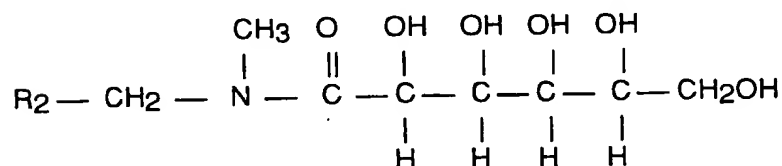
15 wherein n is 7 to 12 such as N-methyl glucamine sulfoamide of a C₈-C₁₃ linear alkyl benzene.

The glucamide is depicted by the formula:



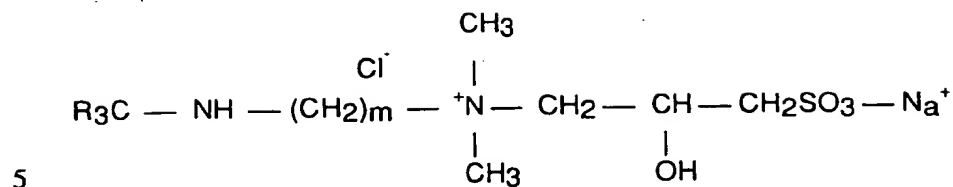
wherein R is a C₁₀ to C₁₄ alkyl group, such as coco fatty acid-N-methylglucamide.

25 The inverse glucamide is depicted by the formula:



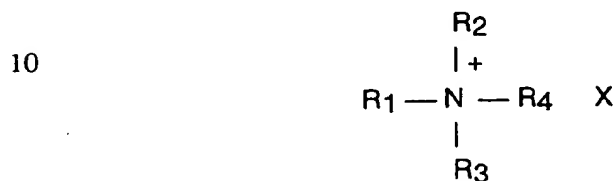
30 wherein R₂ is a C₉ to C₁₂ group, such as N-methyl-cocoalkyl glucamide.

The hydroxy sulfobetaine (hydroxy sultaine) is depicted by the formula:

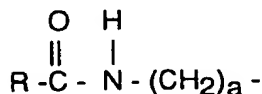


wherein R is a C₁₂-C₁₄ mixed alkyl group of 70 wt. % C₁₂ and 30 wt. % of C₁₄.

The water-soluble zwitterionic surfactant, which can be used in the cleaning compositions is a water soluble betaine having the general formula:



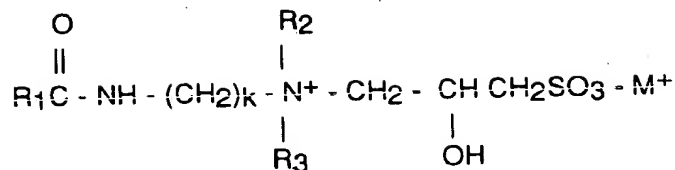
wherein X⁻ is selected from the group consisting of CO₂⁻ and SO₃⁻ and R₁ is an alkyl group having 10 to 20 carbon atoms, preferably 12 to 16 carbon atoms, or the amido radical:



wherein R is an alkyl group having 9 to 19 carbon atoms and a is the integer 1 to 4; R₂ and R₃ are each alkyl groups having 1 to 3 carbons and preferably 1 carbon; R₄ is an alkylene or hydroxyalkylene group having from 1 to 4 carbon atoms and, optionally, one hydroxyl group. Typical alkyldimethyl betaines include decyl dimethyl betaine or 2-(N-decyl-N, N-dimethyl-ammonia) acetate, coco dimethyl betaine or 2-(N-coco N, N-dimethylammonia) acetate, myristyl dimethyl betaine, palmityl dimethyl betaine, lauryl dimethyl betaine, cetyl dimethyl betaine, stearyl dimethyl betaine, etc. The amidobetaines similarly include cocoamidoethylbetaine, cocoamidopropyl betaine and the like. A preferred betaine is coco (C₈-C₁₈) amidopropyl dimethyl betaine. Three preferred betaine surfactants are Genagen CAB and Rewoteric AMB 13 and Golmschmidt Betaine L7.

Another zwitterionic surfactant which can be used in the instant composition is a cocoamido-propylhydroxy sultaine. The sultaine can be depicted by the formula:

11

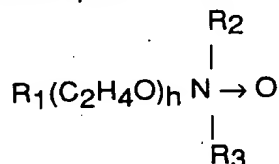


5

wherein R_1 is a saturated or unsaturated alkyl group having 6 to 24 carbon atoms, R_2 is a methyl or ethyl group, R_3 is a methyl or ethyl group, k is 1 to 6, and M^+ is an alkali metal cation. The most preferred hydroxysultaine is a potassium salt of cocoamidopropyl hydroxysultaine.

10

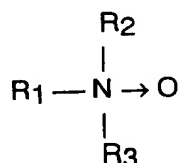
Amine oxide semi-polar nonionic surfactants which can be used in the instant compositions comprise compounds and mixtures of compounds having the formula:



15

wherein R_1 is an alkyl, 2-hydroxyalkyl, 3-hydroxyalkyl, or 3-alkoxy-2-hydroxypropyl radical in which the alkyl and alkoxy, respectively, contain from 8 to 18 carbon atoms, R_2 and R_3 are each methyl, ethyl, propyl, isopropyl, 2-hydroxyethyl, 2-hydroxypropyl, or 3-hydroxypropyl, and h is from 0 to 10. Particularly preferred are amine oxides of the formula:

20



25

wherein R_1 is a C_{12-16} alkyl, or cocoamidopropyl group and R_2 and R_3 are methyl or ethyl. The above ethylene oxide condensates, amides, and amine oxides are more fully described in U.S. Pat. No. 4,316,824 which is hereby incorporated herein by reference. Preferred amine oxides are lauryl amine oxide and cocoamido propyl amine oxide.

30

The water soluble nonionic surfactants utilized in this invention are commercially well known and include the primary aliphatic alcohol ethoxylates, secondary aliphatic alcohol ethoxylates, alkylphenol ethoxylates and ethylene-oxide-propylene oxide condensates on primary alkanols, such as Plurafacs (BASF) and condensates of ethylene

35

oxide with sorbitan fatty acid esters such as the Tweens (ICI). The nonionic synthetic organic detergents generally are the condensation products of an organic aliphatic or alkyl aromatic hydrophobic compound and hydrophilic ethylene oxide groups. Practically any hydrophobic compound having a carboxy, hydroxy, amido, or amino group with a free

5 hydrogen attached to the nitrogen can be condensed with ethylene oxide or with the polyhydration product thereof, polyethylene glycol, to form a water-soluble nonionic detergent. Further, the length of the polyethenoxy chain can be adjusted to achieve the desired balance between the hydrophobic and hydrophilic elements.

The nonionic surfactant class includes the condensation products of a higher
10 alcohol (e.g., an alkanol containing 8 to 18 carbon atoms in a straight or branched chain configuration) condensed with 5 to 30 moles of ethylene oxide, for example, lauryl or myristyl alcohol condensed with 16 moles of ethylene oxide (EO), tridecanol condensed with 6 to moles of EO, myristyl alcohol condensed with 10 moles of EO per mole of myristyl alcohol, the condensation product of EO with a cut of coconut fatty alcohol containing a
15 mixture of fatty alcohols with alkyl chains varying from 10 to 14 carbon atoms in length and wherein the condensate contains either 6 moles of EO per mole of total alcohol or 9 moles of EO per mole of alcohol and tallow alcohol ethoxylates containing 6 EO to 11 EO per mole of alcohol.

A preferred group of the foregoing nonionic surfactants are the Neodol ethoxylates
20 (Shell Co.), which are higher aliphatic, primary alcohol containing 9-15 carbon atoms, such as C₉-C₁₁ alkanol condensed with 8 moles of ethylene oxide (Neodol 91-8), C₁₂₋₁₃ alkanol condensed with 6.5 moles ethylene oxide (Neodol 23-6.5), C₁₂₋₁₅ alkanol condensed with 12 moles ethylene oxide (Neodol 25-12), C₁₄₋₁₅ alkanol condensed with 13 moles ethylene oxide (Neodol 45-13), and the like. Such ethoxamers have an HLB
25 (hydrophobic lipophilic balance) value of 8-15 and give good O/W emulsification, whereas ethoxamers with HLB values below 8 contain less than 5 ethyleneoxide groups and tend to be poor emulsifiers and poor surfactants.

Additional satisfactory water soluble alcohol ethylene oxide condensates are the condensation products of a secondary aliphatic alcohol containing 8 to 18 carbon atoms in

a straight or branched chain configuration condensed with 5 to 30 moles of ethylene oxide. Examples of commercially available nonionic detergents of the foregoing type are C₁₁-C₁₅ secondary alkanol condensed with either 9 EO (Tergitol 15-S-9) or 12 EO (Tergitol 15-S-12) marketed by Union Carbide.

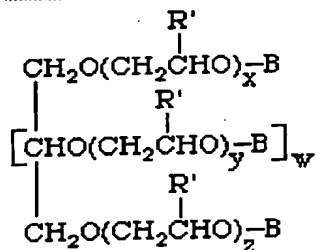
5 Other suitable nonionic surfactants include the polyethylene oxide condensates of one mole of alkyl phenol containing from 8 to 18 carbon atoms in a straight- or branched chain alkyl group with 5 to 30 moles of ethylene oxide. Specific examples of alkyl phenol ethoxylates include nonyl phenol condensed with 9.5 moles of EO per mole of nonyl phenol, dinonyl phenol condensed with 12 moles of EO per mole of dinonyl phenol, dinonyl
10 phenol condensed with 15 moles of EO per mole of phenol and di-isooctylphenol condensed with 15 moles of EO per mole of phenol. Commercially available nonionic surfactants of this type include Igepal CO-630 (nonyl phenol ethoxylate) marketed by GAF Corporation.

Condensates of 2 to 30 moles of ethylene oxide with sorbitan mono- and tri-C₁₀-C₂₀ alkanolic acid esters having a HLB of 8 to 15 also may be employed as the nonionic
15 detergent ingredient in the described shampoo. These surfactants are well known and are available from Imperial Chemical Industries under the Tween trade name. Suitable surfactants include polyoxyethylene (4) sorbitan monolaurate, polyoxyethylene (4) sorbitan monostearate, polyoxyethylene (20) sorbitan trioleate and polyoxyethylene (20) sorbitan tristearate.

20 The anionic surfactants which may be used in the cleaning compositions of this invention are water soluble such as triethanolamine and include the sodium, potassium, ammonium and ethanolammonium salts of C₈-C₁₈ alkyl sulfates such as lauryl sulfate, myristyl sulfate and the like; C₈-C₁₈ alkyl ethoxylated ether sulfates having 3 to 20 ethylene oxide groups; linear C₈-C₁₆ alkyl benzene sulfonates; C₁₀-C₂₀ paraffin
25 sulfonates; alpha olefin sulfonates containing 10-24 carbon atoms; C₈-C₁₈ alkyl sulfoacetates; C₈-C₁₈ alkyl sulfosuccinate esters; C₈-C₁₈ acyl isethionates; and C₈-C₁₈ acyl taurates. Preferred anionic surfactants are the water soluble C₁₂-C₁₆ alkyl sulfates, the C₁₀-C₁₅ alkylbenzene sulfonates, the C₁₃-C₁₇ paraffin sulfonates and the alpha C₁₂-C₁₈ olefin sulfonates.

The instant composition can contain a surfactant (herein after referred to as ethoxylated glycerol type compound) which is a mixture of a fully esterified ethoxylated polyhydric alcohol, a partially esterified ethoxylated polyhydric alcohol and a nonesterified ethoxylated polyhydric alcohol, wherein the preferred polyhydric alcohol is glycerol, and the

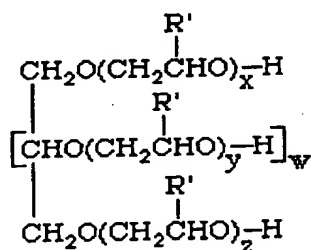
5 compound is



Formula

(I)

and



Formula

(II)

wherein w equals one to four, most preferably one. B is selected from the group consisting
10 of hydrogen or a group represented by:



wherein R is selected from the group consisting of alkyl group having 6 to 22 carbon
15 atoms, more preferably 11 to 15 carbon atoms and alkenyl groups having 6 to 22 carbon atoms, more preferably 11 to 15 carbon atoms, wherein a hydrogenated tallow alkyl chain or a coco alkyl chain is most preferred, wherein at least one of the B groups is represented by said



and R' is selected from the group consisting of hydrogen and methyl groups; x, y and z have a value between 0 and 60, more preferably 0 to 40, provided that (x+y+z) equals 2 to 100, preferably 4 to 24 and most preferably 4 to 19, wherein in Formula (I) the ratio of monoester / diester / triester is 45 to 90 / 5 to 40 / 1 to 20, more preferably 50 to 90 / 9 to 32 / 1 to 12, wherein the ratio of Formula (I) to Formula (II) is a value between 3 to 0.02, preferably 3 to 0.1, most preferably 1.5 to 0.2, wherein it is most preferred that there is more of Formula (II) than Formula (I) in the mixture that forms the compound.

The ethoxylated glycerol type compound used in the instant composition is manufactured by the Kao Corporation and sold under the trade name Levenol such as Levenol F-200 which has an average EO of 6 and a molar ratio of coco fatty acid to glycerol of 0.55 or Levenol V501/2 which has an average EO of 17 and a molar ratio of tallow fatty acid to glycerol of 1.0. It is preferred that the molar ratio of the fatty acid to glycerol is less than 1.7, more preferably less than 1.5 and most preferably less than 1.0. The ethoxylated glycerol type compound has a molecular weight of 400 to 1600, and a pH (50 grams / liter of water) of 5-7. The Levenol compounds are substantially non irritant to human skin and have a primary biodegradability higher than 90% as measured by the Wickbold method Bias-7d.

Two examples of the Levenol compounds are Levenol V-501/2 which has 17 ethoxylated groups and is derived from tallow fatty acid with a fatty acid to glycerol ratio of 1.0 and a molecular weight of 1465 and Levenol F-200 has 6 ethoxylated groups and is derived from coco fatty acid with a fatty acid to glycerol ratio of 0.55. Both Levenol F-200 and Levenol V-501/2 are composed of a mixture of Formula (I) and Formula (II). The Levenol compounds has ecotoxicity values of algae growth inhibition > 100 mg/liter; acute toxicity for Daphniae > 100 mg/liter and acute fish toxicity > 100 mg/liter. The Levenol compounds have a ready biodegradability higher than 60% which is the minimum required value according to OECD 301B measurement to be acceptably biodegradable.

Polyesterified nonionic compounds also useful in the instant compositions are Crovol PK-40 and Crovol PK-70 manufactured by Croda GMBH of the Netherlands. Crovol PK-40 is a polyoxyethylene (12) Palm Kernel Glyceride which has 12 EO groups. Crovol PK-70 which is preferred is a polyoxyethylene (45) Palm Kernel Glyceride have 45 EO

5. groups.

The instant compositions can contain an alkyl polysaccharide surfactant. The alkyl polysaccharides surfactants, which are used in conjunction with the aforementioned surfactant have a hydrophobic group containing from 8 to 20 carbon atoms, preferably from 10 to 16 carbon atoms, most preferably from 12 to 14 carbon atoms, and polysaccharide hydrophilic group containing from 1.5 to 10, preferably from 1.5 to 4, most preferably from 1.6 to 2.7 saccharide units (e.g., galactoside, glucoside, fructoside, glucosyl, fructosyl; and/or galactosyl units). Mixtures of saccharide moieties may be used in the alkyl polysaccharide surfactants. The number x indicates the number of saccharide units in a particular alkyl polysaccharide surfactant. For a particular alkyl polysaccharide molecule x can only assume integral values. In any physical sample of alkyl polysaccharide surfactants there will be in general molecules having different x values. The physical sample can be characterized by the average value of x and this average value can assume non-integral values. In this specification the values of x are to be understood to be average values. The hydrophobic group (R) can be attached at the 2-, 3-, or 4- positions rather than at the 1-position, (thus giving e.g. a glucosyl or galactosyl as opposed to a glucoside or galactoside). However, attachment through the 1- position, i.e., glucosides, galactoside, fructosides, etc., is preferred. In the preferred product the additional saccharide units are predominately attached to the previous saccharide unit's 2-position. Attachment through the 3-, 4-, and 6- positions can also occur. Optionally and less desirably there can be a polyalkoxide chain joining the hydrophobic moiety (R) and the polysaccharide chain. The preferred alkoxide moiety is ethoxide.

Typical hydrophobic groups include alkyl groups, either saturated or unsaturated, branched or unbranched containing from 8 to 20, preferably from 10 to 18 carbon atoms. Preferably, the alkyl group is a straight chain saturated alkyl group. The alkyl group can

contain up to 3 hydroxy groups and/or the polyalkoxide chain can contain up to 30, preferably less than 10, alkoxide moieties.

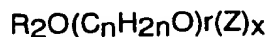
Suitable alkyl polysaccharides are decyl, dodecyl, tetradecyl, pentadecyl, hexadecyl, and octadecyl, di-, tri-, tetra-, penta-, and hexagluco-

5 lactosides, fructosides, fructosyls, lactosyls, glucosyls and/or galactosyls and mixtures thereof.

The alkyl monosaccharides are relatively less soluble in water than the higher alkyl polysaccharides. When used in admixture with alkyl polysaccharides, the alkyl monosaccharides are solubilized to some extent. The use of alkyl monosaccharides in admixture with alkyl polysaccharides is a preferred mode of carrying out the invention. Suitable mixtures include coconut alkyl, di-, tri-, tetra-, and pentagluco-

10 tetra-, penta-, and hexagluco-

The preferred alkyl polysaccharides are alkyl polyglucosides having the formula



15 wherein Z is derived from glucose, R is a hydrophobic group selected from the group consisting of alkyl, alkylphenyl, hydroxyalkylphenyl, and mixtures thereof in which said alkyl groups contain from 10 to 18, preferably from 12 to 14 carbon atoms; n is 2 or 3 preferably 2, r is from 0 to 10, preferable 0; and x is from 1.5 to 8, preferably from 1.5 to 4, most preferably from 1.6 to 2.7. To prepare these compounds a long chain alcohol (R_2OH)

20 can be reacted with glucose, in the presence of an acid catalyst to form the desired glucoside. Alternatively the alkyl polyglucosides can be prepared by a two step procedure in which a short chain alcohol (R_1OH) can be reacted with glucose, in the presence of an acid catalyst to form the desired glucoside. Alternatively the alkyl polyglucosides can be prepared by a two step procedure in which a short chain alcohol (C_{1-6}) is reacted with

25 glucose or a polyglucoside ($x=2$ to 4) to yield a short chain alkyl glucoside ($x=1$ to 4) which can in turn be reacted with a longer chain alcohol (R_2OH) to displace the short chain alcohol and obtain the desired alkyl polyglucoside. If this two step procedure is used, the short chain alkylglucoside content of the final alkyl polyglucoside material should be less

than 50%, preferably less than 10%, more preferably less than 5%, most preferably 0% of the alkyl polyglucoside.

The amount of unreacted alcohol (the free fatty alcohol content) in the desired alkyl polysaccharide surfactant is preferably less than 2%, more preferably less than 0.5% by weight of the total of the alkyl polysaccharide. For some uses it is desirable to have the alkyl monosaccharide content less than 10%.

The used herein, "alkyl polysaccharide surfactant" is intended to represent both the preferred glucose and galactose derived surfactants and the less preferred alkyl polysaccharide surfactants. Throughout this specification, "alkyl polyglucoside" is used to include alkyl polyglycosides because the stereochemistry of the saccharide moiety is changed during the preparation reaction.

An especially preferred APG glycoside surfactant is APG 625 glycoside manufactured by the Henkel Corporation of Ambler, PA. APG25 is a nonionic alkyl polyglycoside characterized by the formula:



wherein $n=10$ (2%); $n=122$ (65%); $n=14$ (21-28%); $n=16$ (4-8%) and $n=18$ (0.5%) and x (degree of polymerization) = 1.6. APG 625 has: a pH of 6 to 10 (10% of APG 625 in distilled water); a specific gravity at 25°C of 1.1 g/ml; a density at 25°C of 9.1 lbs/gallon; a calculated HLB of 12.1 and a Brookfield viscosity at 35°C, 21 spindle, 5-10 RPM of 3,000 to 7,000 cps.

A water insoluble saturated or unsaturated organic compound can be optionally used. The water insoluble saturated or unsaturated organic compound is selected from the group consisting of perfumes, essential oils or water insoluble hydrocarbons containing a cycloalkyl group having 5 to 10 carbon atoms, wherein the alkyl or cycloalkyl group can be saturated or unsaturated and the cycloalkyl group can have one or more saturated or unsaturated alkyl groups having 1 to 20 carbon atoms affixed to the alkyl or cycloalkyl group and one or more halogens, alcohols, nitro or ester group substituted on the cycloalkyl group or alkyl group; aromatic hydrocarbons; water insoluble ethers; water insoluble carboxylic acids, water insoluble alcohols, water insoluble amines, water

- insoluble aromatic or aliphatic esters, nitropropane, 2,5dimethylhydrofuran, 2-ethyl-2-methyl-1,3dioxolane, 3-ethyl-4-propyl tetrahydropyran, N-isopropyl morpholine, alpha-methylbenzyl dimethylamine, methyl chloroform and methyl perchloropropane, and mixtures thereof. Typical hydrocarbons are cyclohexyl-1 decane, methyl-3 cyclohexyl-9 nonane,
-
- 5 methyl-3 cyclohexyl-6 nonane, dimethyl cyclohexane, trimethyl cyclopentane, ethyl-2 isopropyl-4 cyclohexane. Typical aromatic hydrocarbons are bromotoluene, diethyl benzene, cyclohexyl bromoxylene, ethyl-3 pentyl-4 toluene, tetrahydronaphthalene, nitrobenzene, and methyl naphthalene. Typical water insoluble esters are benzyl acetate, dicyclopentadienylacetate, isononyl acetate, isobornyl acetate and isobutyl isobutyrate.
- 10 Typical water insoluble ethers are di(alpha-methyl benzyl) ether, and diphenyl ether. A typical alcohol is phenoxyethanol. A typical water insoluble nitro derivative is nitro propane.

Suitable essential oils are selected from the group consisting of:

- Anethole 20/21 natural, Aniseed oil china star, Aniseed oil globe brand, Balsam (Peru),
- 15 Basil oil (India), Black pepper oil, Black pepper oleoresin 40/20, Bois de Rose (Brazil) FOB, Borneol Flakes (China), Camphor oil, White, Camphor powder synthetic technical, Cananga oil (Java), Cardamom oil, Cassia oil (China), Cedarwood oil (China) BP, Cinnamon bark oil, Cinnamon leaf oil, Citronella oil, Clove bud oil, Clove leaf, Coriander (Russia), Coumarin 69°C (China), Cyclamen Aldehyde, Diphenyl oxide, Ethyl vanilin,
- 20 Eucalyptol, Eucalyptus oil, Eucalyptus citriodora, Fennel oil, Geranium oil, Ginger oil, Ginger oleoresin (India), White grapefruit oil, Guaiacwood oil, Gurjun balsam, Heliotropin, Isobornyl acetate, Isolongifolene, Juniper berry oil, L-methyl acetate, Lavender oil, Lemon oil, Lemongrass oil, Lime oil distilled, Litsea Cubeba oil, Longifolene, Menthol crystals, Methyl cedryl ketone, Methyl chavicol, Methyl salicylate, Musk ambrette, Musk ketone,
- 25 Musk xylol, Nutmeg oil, Orange oil, Patchouli oil, Peppermint oil, Phenyl ethyl alcohol, Pimento berry oil, Pimento leaf oil, Rosalin, Sandalwood oil, Sandenol, Sage oil, Clary sage, Sassafras oil, Spearmint oil, Spike lavender, Tagetes, Tea tree oil, Vanilin, Vetyver oil (Java), Wintergreen, Allocimene, ArbanexTM, Arbanol[®], Bergamot oils, Camphene, Alpha-Campholenic aldehyde, l-Carvone, Cineoles, Citral, Citronellol Terpenes, Alpha-

- Citronellol, Citronellyl Acetate, Citronellyl Nitrile, Para-Cymene, Dihydroanethole, Dihydrocarveol, d-Dihydrocarvone, Dihydrolinalool, Dihydromyrcene, Dihydromyrcenol, Dihydromyrcenyl Acetate, Dihydroterpineol, Dimethyloctanal, Dimethyloctanol, Dimethyloctanyl Acetate, Estragole, Ethyl-2 Methylbutyrate, Fenchol, FerniolTM, FlorilysTM,
-
- 5 Geraniol, Geranyl Acetate, Geranyl Nitrile, GlidmintTM Mint oils, GlidoxTM, Grapefruit oils, trans-2-Hexenal, trans-2-Hexenol, cis-3-Hexenyl Isovalerate, cis-3-Hexanyl-2-methylbutyrate, Hexyl Isovalerate, Hexyl-2-methylbutyrate, Hydroxycitronellal, Ionone, Isobornyl Methylether, Linalool, Linalool Oxide, Linalyl Acetate, Menthane Hydroperoxide, l-Methyl Acetate, Methyl Hexyl Ether, Methyl-2-methylbutyrate, 2-Methylbutyl Isovalerate,
- 10 Myrcene, Nerol, Neryl Acetate, 3-Octanol, 3-Octyl Acetate, Phenyl Ethyl-2-methylbutyrate, Petitgrain oil, cis-Pinane, Pinane Hydroperoxide, Pinanol, Pine Ester, Pine Needle oils, Pine oil, alpha-Pinene, beta-Pinene, alpha-Pinene Oxide, Plinol, Plinyl Acetate, Pseudo Ionone, Rhodinol, Rhodinyl Acetate, Spice oils, alpha-Terpinene, gamma-Terpinene, Terpinene-4-OL, Terpineol, Terpinolene, Terpinyl Acetate, Tetrahydrolinalool,
- 15 Tetrahydrolinalyl Acetate, Tetrahydromyrcenol, Tetralol[®], Tomato oils, Vitalizair, ZestoralTM.

The cosurfactant may play an essential role in the formation of the microemulsion and the concentrated microemulsion compositions of the instant invention. Very briefly, in the absence of the cosurfactant the water, detergent(s) and hydrocarbon (e.g., perfume)

20 will, when mixed in appropriate proportions form either a micellar solution (low concentration) or form an oil-in-water emulsion in the first aspect of the invention. With the cosurfactant added to this system, the interfacial tension at the interface between the emulsion droplets and aqueous phase is reduced to a very low value. This reduction of the interfacial tension results in spontaneous break-up of the emulsion droplets to

25 consecutively smaller aggregates until the state of a transparent colloidal sized emulsion. e.g., a microemulsion, is formed. In the state of a microemulsion, thermodynamic factors come into balance with varying degrees of stability related to the total free energy of the microemulsion. Some of the thermodynamic factors involved in determining the total free energy of the system are (1) particle-particle potential; (2) interfacial tension or free energy

(stretching and bending); (3) droplet dispersion entropy; and (4) chemical potential changes upon formation. A thermodynamically stable system is achieved when (2) interfacial tension or free energy is minimized and (3) droplet dispersion entropy is maximized.

5 Thus, the role of cosurfactant in formation of a stable o/w microemulsion is to (a) decrease interfacial tension (2); and (b) modify the microemulsion structure and increase the number of possible configurations (3). Also, the cosurfactant will (c) decrease the rigidity. Generally, an increase in cosurfactant concentration results in a wider temperature range of the stability of the product.

10 The major class of compounds found to provide highly suitable cosurfactants for the microemulsion over temperature ranges extending from 5°C to 43°C for instance are water-soluble polyethylene glycols having a molecular weight of 150 to 1000, polypropylene glycol of the formula $\text{HO}(\text{CH}_2\text{CHCH}_2\text{O})_n\text{H}$ wherein n is a number from 2 to 18, mixtures of polyethylene glycol and polypropyl glycol (Synalox) and mono and di C₁-
15 C₆ alkyl ethers and esters of ethylene glycol and propylene glycol having the structural formulas $\text{R}(\text{X})_n\text{OH}$ $\text{R}_1(\text{X})_n\text{OH}$ $\text{R}(\text{X})_n\text{OR}$ and $\text{R}_1(\text{X})_n\text{OR}_1$ wherein R is C₁-C₆ alkyl group, R₁ is C₂-C₄ acyl group, X is (OCH₂CH₂) or (OCH₂(CH₃)CH) and n is a number from 1 to 4, diethylene glycol, triethylene glycol, an alkyl lactate, wherein the alkyl group has 1 to 6 carbon atoms, 1methoxy-2-propanol, 1methoxy-3-propanol, and 1methoxy 2-, 3- or 4-
20 butanol.

Representative members of the polypropylene glycol include dipropylene glycol and polypropylene glycol having a molecular weight of 150 to 1000, e.g., polypropylene glycol 400. Other satisfactory glycol ethers are ethylene glycol monobutyl ether (butyl cellosolve), diethylene glycol monobutyl ether (butyl carbitol), triethylene glycol monobutyl ether, mono,
25 di, tri propylene glycol monobutyl ether, tetraethylene glycol monobutyl ether, mono, di, tripropylene glycol monomethyl ether, propylene glycol monomethyl ether, ethylene glycol monohexyl ether, diethylene glycol monohexyl ether, propylene glycol tertiary butyl ether, ethylene glycol monoethyl ether, ethylene glycol monomethyl ether, ethylene glycol monopropyl ether, ethylene glycol monopentyl ether, diethylene glycol monomethyl ether,

diethylene glycol monoethyl ether, diethylene glycol monopropyl ether, diethylene glycol monopentyl ether, triethylene glycol monomethyl ether, triethylene glycol monoethyl ether, triethylene glycol monopropyl ether, triethylene glycol monopentyl ether, triethylene glycol monohexyl ether, mono, di, tripropylene glycol monoethyl ether, mono, di tripropylene

5 glycol monopropyl ether, mono, di, tripropylene glycol monopentyl ether, mono, di, tripropylene glycol monohexyl ether, mono, di, tributylene glycol mono methyl ether, mono, di, tributylene glycol monoethyl ether, mono, di, tributylene glycol monopropyl ether, mono, di, tributylene glycol monobutyl ether, mono, di, tributylene glycol monopentyl ether and mono, di, tributylene glycol monohexyl ether, ethylene glycol monoacetate and dipropylene
10 glycol propionate. When these glycol type cosurfactants are at a concentration of 1.0 to 50 wt. %, more preferably 1.5 wt. % to 20 wt. %, especially preferably 2 wt. % to 15 wt. % in combination with a water insoluble hydrocarbon at a concentration of at least 0.5 weight %, more preferably 1.5 weight % one can form a microemulsion composition.

While all of the aforementioned glycol ether compounds provide the described
15 stability, the most preferred cosurfactant compounds of each type, on the basis of cost and cosmetic appearance (particularly odor), are dipropylene glycol monomethyl ether and diethylene glycol monobutyl ether. Other suitable water insoluble cosurfactants are water soluble esters such as ethyl lactate and water soluble carbohydrates such as butyl glycosides.

20 The amount of cosurfactant required to stabilize the microemulsion compositions will, of course, depend on such factors as the surface tension characteristics of the cosurfactant, the type and amounts of the primary surfactants and water insoluble hydrocarbon, and the type and amounts of any other additional ingredients which may be present in the composition and which have an influence on the thermodynamic factors
25 enumerated above. Generally, amounts of cosurfactant in the range of from 0 to 50 wt. %, preferably from 1 wt. % to 20 wt. %, more preferably from 2 wt. % to 15 wt. % provide stable dilute o/w microemulsions for the above-described levels of primary surfactants and water insoluble hydrocarbon and any other additional ingredients as described below.

The ability to formulate mild, acid or neutral products without builders which have grease removal capacities is a feature of the present invention because the prior art o/w microemulsion formulations most usually are highly alkaline or highly built or both.

The instant microemulsion formulas explicitly exclude alkali metal silicates and

- 5 alkali metal builders such as alkali metal polyphosphates, alkali metal carbonates, alkali metal phosphonates and alkali metal citrates because these materials, if used in the instant composition, would cause the composition to have a high pH as well as leaving residue on the surface being cleaned.

- 10 The surfactants discussed above can be solubilized in one preferred nonmicroemulsion embodiment of the invention in an aqueous medium comprising water and a mixture of an alkyl monoethanol amides such as C₁₂-C₁₄ alkyl monoethanol amide (LMMEA) at a concentration of 1 to 4 wt. %, and an alkyl diethanol amides such as coco diethanol amide (CDEA) or lauryl diethanol amide (LDEA) at a concentration of 1 to 4 wt. % wherein the ratio of monoethanol amide to diethanol amide is 3:1 to 1:3.

- 15 Less preferred solubilizing agents are C₂-C₃ mono and di-hydroxy alkanols, e.g., ethanol, isopropanol and propylene glycol. Suitable water soluble hydrotropic salts include sodium, potassium, ammonium and mono-, di- and triethanolammonium salts. While the aqueous medium is primarily water, preferably said solubilizing agents are included in order to control the viscosity of the liquid composition and to control low temperature cloud
- 20 clear properties. Usually, it is desirable to maintain clarity to a temperature in the range of 5°C to 10°C. Therefore, the proportion of solubilizer generally will be from 1% to 15%, preferably 2% to 12%, most preferably 3%-8%, by weight of the detergent composition with the proportion of ethanol, when present, being 5% of weight or less in order to provide a composition having a flash point above 46°C. Preferably the solubilizing ingredient will be
- 25 a mixture of ethanol and a water soluble salt of a C₁-C₃ substituted benzene sulfonate hydrotrope such as sodium xylene sulfonate or sodium cumene sulfonate or a mixture of said sulfonates or ethanol and urea. Inorganic alkali metal or alkaline earth metal salts such as sodium sulfate, magnesium sulfate, sodium chloride and sodium citrate can be added at concentrations of 0.5 to 4.0 wt.% to modify the cloud point of the nonionic

surfactant and thereby control the haze of the resultant solution. Various other ingredients such as urea at a concentration of 0.5 to 4.0 wt.% or urea at the same concentration in combination with ethanol at a concentration of 0.5 to 4.0 wt.% can be used as solubilizing agents.

5 The cleaning composition of this invention may, if desired, also contain other components either to provide additional effect or to make the product more attractive to the consumer. The following are mentioned by way of example: Colors or dyes in amounts up to 0.5% by weight; bactericides in amounts up to 1% by weight; preservatives or
10 antioxidantizing agents, such as formalin, 5-bromo-5-nitro-dioxan-1,3; 5-chloro-2-methyl-4-isothiazolin-3-one, 2,6-di-tert.butyl-p-cresol, etc., in amounts up to 2% by weight; and pH adjusting agents, such as sulfuric acid or sodium hydroxide, as needed. Furthermore, if opaque compositions are desired, up to 4% by weight of an opacifier may be added.

The final ingredient in the instant composition is water. The instant cleaning compositions are made by simple mixing at temperatures of 25°C to 50°C.

15 The following example illustrates liquid cleaning compositions of the described invention. Unless otherwise specified, all percentages are by weight. The exemplified compositions are illustrative only and do not limit the scope of the invention. Unless otherwise specified, the proportions in the examples and elsewhere in the specification are by weight.

20 After Example, cleaning compositions A through E are optically clear, in a single phase, and stable at 4°C.

Example 1

The following compositions in wt. % were prepared by simple mixing procedure:

Raw Materials	A	B	C	D	E	H	G
Sodium paraffin sulfonate C ₁₄ -C ₁₇ (60%)	--	--	--	--	4.7	--	25.5
Sodium-C ₉ -C ₁₃ -linear-alkylbenzene sulfonate (52%)	5.95	6.12	5.95	2.98	--	--	--
Magnesium C ₉ -C ₁₃ linear alkylbenzene sulfonate (43.7%)	--	--	--	2.98	--	--	--
NaAEOS (1.3:1) (59%)	--	--	--	--	--	18.5	--
NaAEOS (2:1) (70%)	--	--	--	--	--	--	8.5
N-octyl ribonamide (98%)	1.05	1.35	--	1.05	1.0	2.0	2.0
N-decyl ribonamide (98%)	--	--	1.05	--	--	--	--
Levenol F-200	--	1.53	--	--	2.3	--	--
Neodol 1.9 (C ₁₀ E9)	--	--	--	--	--	8.5	--
APG 625 (50.5%)	--	--	--	--	--	6.8	--
C ₁₂ -C ₁₄ alkyl dimethyl betaine (30%)	--	--	--	--	--	3.0	--
Cocoamido propyl amine oxide (35%)	--	--	--	--	--	4.0	--
Diethylene glycol mono n-butyl ether	2.0	--	8.0	6.0	5.5	--	--
Dipropylene glycol mono methyl ether	--	--	--	--	--	--	8.0
Urea	--	--	--	--	--	--	5.0
Coco Fatty Acid	--	--	--	0.75	0.75	--	--
MgSO ₄ ·7H ₂ O	--	--	--	0.11	0.07	--	--
NaOH (50%)	--	--	--	--	--	--	6.0
d-Limonene	0.8	--	0.8	0.8	0.8	--	0.5
Perfume	--	--	--	0.2	0.2	--	0.2
Minors	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.
Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.
Physical stability	Yes	Yes	Yes	Yes	Yes	Yes	Yes
RT	Yes	Yes	Yes	Yes	Yes	Hazy	Yes
4°C (one week)	Yes	Yes	Yes	Yes	Yes	Hazy	Yes

Example 2

5 The following compositions in wt. % were prepared:

Raw Materials	A	B	C	D	E	F	G	H
Sodium lauryl sulfate (99%)	1.0	--	0.4	0.4	0.05	0.4	--	--
Linear alkylbenzene sulfonate (LAS) C ₉ -C ₁₃ sodium salt (52%)	--	0.8	--	--	--	--	0.4	0.4
Coco (C ₁₂ -C ₁₄) fatty acid-N-methylglucamide (95%)	--	--	0.4	--	--	--	--	--
N-methylglucamine sulfonamide of C ₉ -C ₁₃ linear alkylbenzene (95%)	--	--	--	0.4	--	--	--	--
N-octyl ribonamide (98%)	--	--	--	--	0.05	--	--	--
N-methyl-cocoalkylglucamide (98%)	--	--	--	--	--	0.4	--	--
Cocoamidopropyl betaine (30%)	--	--	--	--	--	--	0.4	--
Cocoamidopropyl hydroxy sulfobetaine (44%)	--	--	--	--	--	--	--	0.4
Water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.
Adhesion tension (a)	10.2	13.2	15.5	19.4	10.0	15.7	18.5	18.0
Contact angle (a)	73°	68°	57°	44.5°	72.5°	54.5°	48°	48°

(a) adhesion tension and contact angle measured at a concentration of 1 gram of surfactant per liter of water at 25°C on glycerol tripalmitate.

What Is Claimed Is

1. A cleaning composition comprising by weight:
 - (a) 0.5 to 40 wt. % of at least one first surfactant selected from the group consisting of nonionic surfactants, anionic surfactants, partially esterified ethoxylated
5 glycerol surfactants, and alkyl polyglucoside surfactants and mixtures thereof;
 - (b) 0.1 to 10% of a second surfactant selected from the group consisting of sulfonamide, hydroxy sulfobetaine, betaines, amine oxides, glucoamides, N-C₁₋₃ alkyl C₈-C₁₆ alkyl glucoamide, and C₅-C₁₂ N-alkyl aldoamide and mixtures thereof;; and
 - (c) the balance being water.
- 10 2. The composition of Claim 1 further including 0 to 12% of at least one solubilizer.
3. The composition of Claim 2 further including 0.5 to 50% of a cosurfactant.
4. The composition of Claim 3 further including 0.4 to 10% of a perfume, water insoluble organic compound or essential oil.
- 15 5. The composition of Claim 1 wherein the concentration of the at least one surfactant is 0.5 to 30%.
 6. The composition of Claim 5 further including 0 to 6% of a solubilizer.
 7. The composition of Claim 5 further including 0.5 to 50% of a cosurfactant.
 8. The composition of Claim 7 further including 0.4 to 10% of a perfume, water
20 insoluble organic compound or essential oil.

INTERNATIONAL SEARCH REPORT

Intern. Appl. Application No

PCT/US 98/08754

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 C11D1/94 C11D1/86 C11D1/65 C11D1/825 C11D1/83
C11D17/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 C11D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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P, X	EP 0 796 842 A (UNILEVER PLC) 24 September 1997 see examples 18, 19	1, 2, 4-6, 8
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

10 September 1998

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